

P-6.9 Explain how the variables of length, width, tension, and density affect the resonant frequency, harmonics, and pitch of a vibrating string

Revised Taxonomy Levels 2.7 B Explain conceptual knowledge

Physical science students did not address this indicator

It is essential for students to

- ❖ Understand and solve problems using the laws of strings
 - Law of lengths
 - $f/f' = l'/l$
 - the frequency of a string is inversely proportional to its length
 - Law of diameters
 - $f/f' = d'/d$
 - the frequency of a string is inversely proportional to its diameter
 - Law of tensions
 - $f/f' = \sqrt{F}/\sqrt{F'}$
 - the frequency of a string is directly proportional to the square root of the the tension on the string
 - Law of densities
 - $f/f' = \sqrt{D'}/\sqrt{D}$
 - the frequency of a string is inversely proportional to the square root of its density of all other factors
 - Understand fundamentals and harmonics

Assessment

The verb explain means that the major focus of assessment should be for students to “construct a cause and effect model”. In this case, assessments will ensure that students can model how the characteristics a string influence its frequency. Because the indicator is written as conceptual knowledge, assessments should require that students understand the “interrelationships among the basic elements within a larger structure that enable them to function together.” In this case, assessments must show that students can construct a cause and effect statement relating how the frequency of a string is influenced by changes in length, diameter, density, and tension.